CASE STUDY OF A LEADING, PREMIER & PRESTIGEOUS PRIVATE BANK & CLIENT OF SWAFE BPM Pvt. Ltd.

SWAFE

Critical Facility Management

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EXECUTIVE SUMMARY:

Data center management companies want to operate their facilities more efficiently, but struggle to justify the business return on various energy savings investments. The need of hour is to use the capability model by improving the energy efficiency of the data centers without increasing the investments further.

At SWAFE, we have done a good amount of research in improving the energy efficiency of the data centers handled by us. Along with Energy Efficiency we have worked on reduction of Water and Diesel as well and we have picked up some best practices along the way.

For e.g. we have applied several simple design choices to improve the efficiency of a Data Centre of 12680 Sq.Feet with an overall area of 87112 Sq. Feet being handled by SWAFE. We reduced costs on energy, diesel &water of the overall facility thus reducing the impact of the environment.

Our top best practices for energy efficiency have been shared in the next pages:

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DATA CENTER LAYOUT AND CONTENT:

The total raised floor area of the data center is approximately 12680 Sq. ft and is comprised of multiple isolated areas. The main Data Center consists of three blocks divided into 6 Rows. Data Center Building comprises of approx. 87,112 Sq. ft.

The raised floor to dropped ceiling height of the data center is nine feet and the height of the raised floor ranges from 24 to 36 inches. There are approx. 128 Racks, 136 installed Servers, 3 Tape Libraries and 12 Installed Storage units.

- CHILLER: The Data Center complex contains two 230TR Chiller with two Primary Pumps (11KW) and two sets of Secondary Pumps, each set ÐoŶtaiŶiŶg two seÐoŶdarLJ puŵps ;7.5KW□ÐoŶŶeÐted with VFD's.
- UPS SYSTEMS: Two 600KVA UPS Systems (N+1) yielding 7.8KW for IT Equipment.
- PAHU (Precision Air Handling Units): Five PAHU units (32TR,) fed chilled air to the Data Center.
- PDU (Power Distribution Units): Total 12 Power distribution units distribute power to the Data CeŶter. "idžPDU's oŶ eaÐh side ÐoŶŶeÐted to sidžrows thus ensuring two sources for each row at same time.
- Tape off Boxes: Tape Off Boxes connected to each Server further distribute the power to Server racks mounted inside the Data Center channelizing power from the Power Distribution Units to the Server racks.
- WLD: Water Leak Detection System installed inside the Data Center and underneath the PAHU units as well.
- VESDA: Very Early Smoke Detection Apparatus installed to detect early signs of Smoke inside and both sides of the Data Center.

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PUE IMPROVEMENT:

We ĐaŶ't ŵaŶage what we doŶ't ŵeasure, so we ŵake it sure to traĐk the data ĐeŶter's eŶergLJ use on regular intervals. PUE (Power Usage Effectiveness) is a ratio used to measure and help reduce the energy used for non-computing functions like cooling and power distribution.

SWAFE has been very aggressive in improving the efficiency of its data centers. It has used hot and cold aisles very effectively, thus avoiding the mixing of cool air entering the data center with the hot air that is being extracted from the room and increases efficiency. In addition we have placed barriers in empty rack slots.
Making of hot and cold aisles in the data centers is not enough to prevent air mixing. To ensure that the hot air does not mix with cold air we have done the rack placing with great intelligence. The higher the delta between the temperatures of the air going into the room and the air exiting, the greater the efficiency of the AC Units. We vent the air in the hot aisle containments directly into the AC Units and puts barriers in all the empty slots in the racks which increased efficiency further. The combination of improvements has reduced the PUE ratio (a measure of data center power and cooling efficiency) from 3.79 to 1.52. The impact of this is to reduce the power and cooling budget by a remarkable margin.

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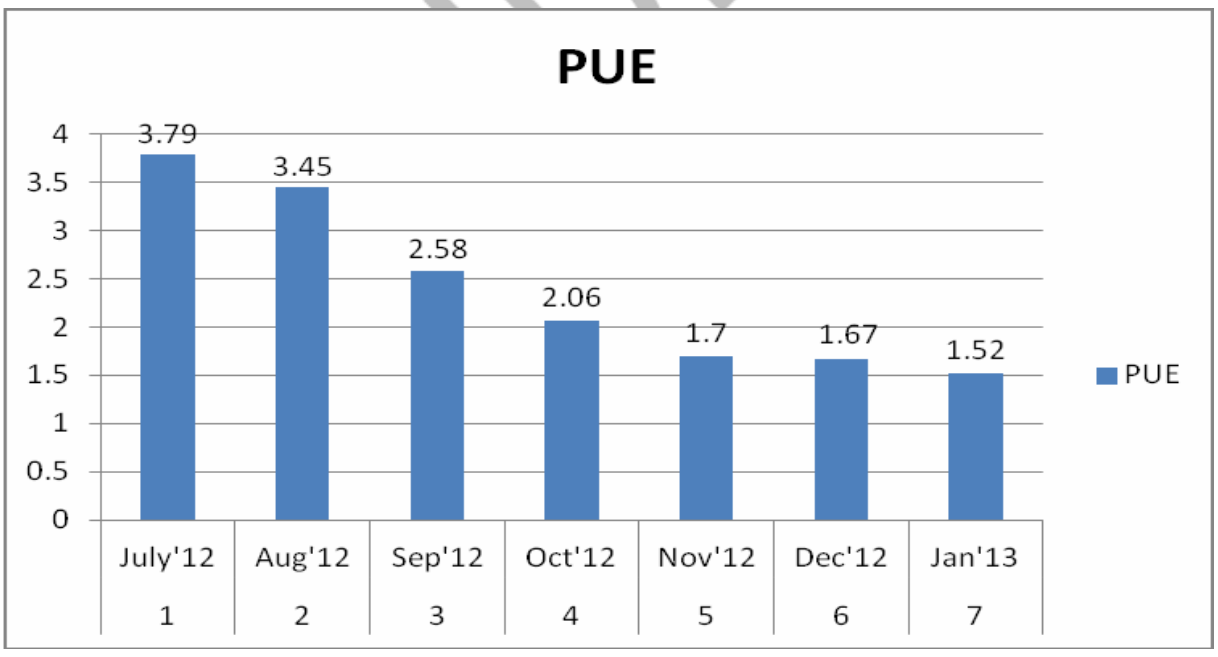
PUE IMPROVEMENT CHART:

The following chart shows the improvement to PUE:

SR.No	MONTH	PUE
1	July'12	3.79
2	Aug'12	3.45
3	Sep'12	2.58
4	Oct'12	2.06
5	Nov'12	1.7
6	Dec'12	1.67
7	Jan'13	1.52



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AIRFLOW MANAGEMENT:

To help our equipment function optimally while continuing to save energy, we managed the temperature and airflow at our data center and machines in simple, cost-effective ways.

We use therŵal ŵodeliŶg to loÐate ħot spots aŶd ďetter uŶderstaŶd airflow in the data center. We physically arranged our equipment to even out temperatures in the facility. We use appropriate ducting and permanent enclosures. In addition, we take simple measures well suited for the data centers being handled by us.

For instance, we:

- Used blanking panels (Metal sheets) to close off empty rack slots and prevent hot aisle air from seeping into to the cold aisle.
- To control the temperature of our equipments we changed the settings of PAHU (Precision Air Handling Units) from 21 to 23 degrees.
- Hanged plastic curtains to seal off the cold aisle.
- Increased the chiller plant set point by 2°F from 44°F to 46°F.
- Adjustment of Intelligent Fan Units temp. Settings inside the Data Center for better air flow.
- Improved rack air flow management by physically changing the location of server racks as per the dimensions.

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OPTIMIZED POWER DISTRIBUTION

We have minimized Power distribution losses by focusing on the efficiency of Power Distribution Units. PDU Load is compared with load on Tape off Boxes for detecting losses and to have a regular check for any phase difference.
One of the largest losses in data center power distribution is from the uninterruptible power supply (UPS), so we make it sure to have a regular check on the UPS Parameters.

These efforts helped us to reduce the total amount of energy used for cooling. At the same time, we ensured that the cooler air we send into the cold aisles is truly cool enough to do its job breaking the myth that data centers need to be kept chilly.

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WATER AND DIESEL SAVINGS

At SWAFE, We have strong emphasis on water and diesel saving techniques as well. Here are some of the techniques:

WATER SAVING TECHNIQES

- Adjustment of sprinklers so that only the garden is watered and not the pathways and sidewalk ways.
- Watering of garden in the morning or evening when temperatures are cooler to minimize evaporation.
- CheÐk the root zoŶe of the gardeŶ for ŵoisture ďefore wateriŶg usiŶg a spade. It it's still moist two inches under the soil surface, we have enough water.
- Layer of organic mulch around plants retains moisture and saves water, time and money.
- Rather than following a set watering schedule, we check for soil moisture two to three inches below the surface before watering.
- Regular check of sprinkler valves periodically for leaks and keep the sprinkler heads in good shape.
- Adjustment of watering schedule each month to match seasonal weather conditions and landscape requirements.

DIESEL SAVING TECHNIQUES

- **Fine Tuning** of DG Set output parameters are done monthly to get better UPL.
- DG Sets have been operated so as to get 400-405 volts instead of 415-420 volts at heavy load end motor terminals. **This gave instant savings in Diesel and without compromising on the load levels.**
- Diesel is not the only input to concentrate in Genset. **Quality of air intake to the Genset** is almost equally important. We make sure to clean air intake filters on regular basis otherwise it may lead to low power, black smoke and turbo charger failure.
- **DP Indicator** is checked on daily basis for choke in the air intake which may lead to higher diesel consumption.
- **DG Loading:** More the DG loading more the units per liter. Hence, we have adjusted the DG load settings from 65% to 70% after which the load shifts to other DG Sets in Auto mode. If settings are 70% to 80% it results in less UPL (Units per ltr.) and gives 10% more units per ltr.

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The team is optimistic that there are more potential savings to be realized and are in the process of developing some next steps recommendations.